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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/821,057	04/08/2004	Henrik T. Jensen	BP 3353	9644

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EXAMINER	
JACKSON, BLANE J	
ART UNIT	**PAPER NUMBER**
2618	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/821,057	JENSEN, HENRIK T.
	Examiner	Art Unit
	Blane J. Jackson	2618

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 April 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,8,13-19* is/are rejected.

7)☒ Claim(s) *4-7,9-12 and 20-22* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Haung et al. (US 6,771,709).

As to claim 1, Haung teaches a radio transmitter within a radio transceiver comprising:

A digital modulator that receives outgoing digital data that digitally modulates the outgoing digital data to produce a digital information signal and compensates the digital information signal to produce a precompensated digital information signal that is pre-

compensated for phase and magnitude imbalance of at least one analog downstream radio transceiver circuit component (figure 2, column 6, lines 32-61, a compensating quadrature modulator (200) comprising amplitude and phase imbalances and DC offset corrected in a quadrature error correcting digital circuit (2101)),

The digital modulator further including an adder to sum in-phase signal component and quadrature phase signal component of the pre-compensated digital information signal to produce an outgoing signal for transmission (figure 2, column 6, lines 52-61, adder (2003) in the I- channel),

A digital to analog converter that receives the pre-compensated digital information signal and that converts the pre-compensated digital information signal to produce a continuous waveform analog signal (figure 2, column 6, lines 61-66, D/As 9230),

A downstream filter that filters the continuous waveform analog signal to produce a filtered continuous waveform analog signal (figure 2, LPFs (240)),

Phase locked loop circuitry that receives the filtered continuous waveform analog signal to produce an output information signal in a selected frequency band column 6, line 52 to column 7, line 3, local oscillator (260) is inherently of a form, a phase locked loop or frequency synthesizer to support stable tuning of the output frequency of this direct conversion transmitter).

Claim 17 is rejected under 35 U.S.C. 102(e) as being anticipated by Glas (US 6,330,290).

As to claim 17, Glas teaches a radio receiver comprising:

A low noise amplifier for receiving an RF signal and for amplifying the RF signal (figure 2, column 5, lines 38-49, LNA (16)),

Phase locked loop circuitry (PLL) that receives the amplified RF signal to produce a down converted in-going continuous waveform signal having in-phase and quadrature phase components (figure 2, column 5, lines 38-49, local oscillator (118) inherently applies as a frequency synthesizer to effect the necessary frequency stability and/ or channel tuning).

Filtering circuitry that filters the in-going continuous waveform signal to produce filtered continuous waveform in-phase and quadrature phase components (figure 2, column 5, lines 38-49, I/Q filtering (26 and 26')),

Analog to digital converter circuitry that receives the filtered continuous waveform in-phase and quadrature phase component and that produces in-going in-phase and quadrature phase digital signals (figure 2, column 5, lines 38-49, I/Q ADCs (27 and 27')),

A digital demodulator that receives in-going in-phase and quadrature phase digital signals that digitally de-modulates the in-going digital signals to produce digital bits out and that compensates the in-going in-phase digital signal to produce a compensated digital information signal that is compensated for phase and magnitude imbalance of at least one analog upstream receiver circuit component (figure 2, column 5, line 55 to column 6, line 3, compensation for imbalance primarily caused by splitter (20)),

The digital de-modulator further including an adder to sum the in-going in-phase digital signal and the in-going quadrature phase digital signal of the in-going in-phase and quadrature phase components of the compensated digital information signal to produce digital bits for processing by a processor (figures 2 and 3, column 5, line 55 to column 6, line 3, adder (106)).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2, 3, 8 and 13-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang et al. (US 6,771,709) in view of Glas (US 6,330,290).

As to claim 2 with respect to claim 1, Haung teaches the digital modulator includes a two part amplification logic comprising a first part controlled multiplier (2002) to adjust the amplitude in the Q channel and second part controlled multiplier (2001) to provide an adjusted Q component to be added in the I channel, figure 2, column 6, lines 52-61, but does not teach a first part of the two part amplification logic amplifies the in-phase component of the digital information signal by a first amount to produce an in-phase component of the pre-compensated digital information signal that is amplitude compensated and a second of the two part amplification logic amplifies the in-phase component of the digital information signal by a second amount to produce an in-phase

component that is summed with the quadrature phase signal component of the digital information signal to produce a quadrature portion of the pre-compensated digital information signal that is phase and magnitude compensated.

Glas teaches a receiver comprising a digital two-part amplification logic to compensate the quadrature signals for amplitude and phase imbalance, figure 3. Glas specifically teaches a compensation unit comprising a first part (controlled amplifier (104)) of the two-part amplification logic *amplifies the Q channel* of the digital information signal and a second (controlled amplifier (102)) of the two-part amplification logic amplifies the in-phase signal component that is summed with the quadrature phase signal component or Q channel of the digital information signal, figures 2 and 3, column 9, lines 1-61.

Since Glas teaches compensation factors affect the quadrature phase branch of the compensation unit but relates the invention is not limited in scope in that respect, figure 3, column 9, lines 10-14, it would have been obvious to one of ordinary skill in the art at the time of the invention to arrange functional components of the compensating unit of Haung in accordance to the arrangement or other suitable arrangement as taught by Glas to effect amplitude and phase compensation in a quadrature modulator/ demodulator.

As to claim 3, Haung teaches the radio transmitter of claim 2 further including compensation logic for producing a compensation control signal to the first part of the two-part amplification logic to individually control amplification levels of the first part of

the two-part amplification logic (figure 2, column 7, lines 3-19, DSP (222) determines the error coefficients based on input from a feedback circuit and pre-distorted signals).

As to claim 8, Haung teaches the radio transmitter of claim 2 further including compensation logic for producing a compensation control signal to the second part of the two-part amplification logic to individually control amplification levels of the second part of the two-part amplification logic (figure 2, column 7, lines 3-19, DSP (222) determines the error coefficients based on input from a feedback circuit and pre-distorted signals).

As to claim 13 with respect to claim 1, Glas of Haung modified teaches a quadrature phase portion of the pre-compensated digital information signal includes an in-phase component compensation (figure 2, column 9, line 10-15, the Q-channel is summed with controlled phase information from the I-channel).

As to claim 14 with respect to claim 13, Glas of Haung modified teaches compensation logic for setting an amount of the in-phase component compensation that is produced to the adder for summing with the quadrature phase portion (column 9, lines 10-61).

As to claim 15 with respect to claim 14, Glas of Haung modified teaches the in-phase component compensation includes an amplified component of a specified amount (column 9, lines 10-61).

As to claim 16 with respect to claim 15, Glas of Haung modified teaches compensation logic for *setting an amount of Q-channel component amplification* of the Q component compensation (column 9, lines 10-61, control of the Q-channel amplitude compensation amplifier is discussed in Glas but is equally applied to an amplifier placed in the I-channel for amplitude compensation, the difference in configuration is the subject of claim 2).

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Glas (US 6,330,290).

Glas teaches a receiver comprising a digital two-part amplification logic to compensate the quadrature signals for amplitude and phase imbalance, figure 3. Glas specifically teaches a compensation unit comprising a first part (controlled amplifier (104)) of the two-part amplification logic *amplifies the Q channel* of the digital information signal and a second (controlled amplifier (102)) of the two-part amplification logic amplifies the in-phase signal component that is summed with the quadrature phase signal component or Q channel of the digital information signal, figures 2 and 3, column 9, lines 1-61. Glas does not illustrate the compensation factors are applied to the in-phase branch of the compensation unit.

However, since Glas teaches compensation factors affect the quadrature phase branch of the compensation unit but relates the invention is not limited in scope in that respect, figure 3, column 9, lines 10-14, it would have been obvious to one of ordinary skill in the art at the time of the invention to alternatively arrange the amplification logic to affect the in-phase branch of the compensation unit which would also compensate for amplitude and phase imbalance.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Glas (US 6,330,290) in view of Demir et al. (US 2004/0264598).

As to claim 19, Glas teaches a method for producing an integrated circuit radio transceiver comprising:

Testing the radio transceiver to determine a transceiver operation metric comprising at least one of a transmitter image rejection ratio and a receiver error rate (column 6, lines 25-39, the transceiver is calibrated for proper imbalance compensation including the digital signal processor (56) measures both desired and image signals),

Evaluating the determined transceiver operational metric to determine whether a specified metric requirement is satisfied (column 6, line 40 to column 7, line 40).

Based upon the evaluating step, determining whether to introduce imbalance compensation in at least one of a receive path or a transmit path (figure 2, column 4, line 35 to column 5, line 35 and column 7, lines 40-47, determined for the receive path),

Amplifying an in-phase component in at least one of the receive path and the transmit path (figure 2, in-phase AGC/ filtering (26)),

Determining an imbalance compensation amount (column 9, lines 1-61, estimation of the imbalance),

Introducing imbalance compensation (figure 3, column 5, line 38 to column 6, line 3, phase information provided by a factor beta and gain information by face alpha).

Glas teaches the need for lower cost transceivers, column 1, lines 10-18, but does not teach producing an integrated circuit radio transceiver chip and producing additional integrated circuit radio transceiver chips including the introduced imbalance compensation.

Demir teaches a method for adjusting the amplitude and phase characteristics in a quadrature radio transmitter with application into a wireless transceiver where the method may be incorporated into an integrated circuit (IC) or configured in a circuit comprising a multitude of interconnection components, figure 1, paragraphs 0027-0029.

Since Demir teaches a wireless transceiver with imbalance compensation, it would have been obvious to one of ordinary skill in the art at the time of the invention to realize the circuit of Glas as an integrated circuit as taught by Demir to reduce the cost of manufacture.

Glas of Glas modified does not illustrate the compensation factors are applied to the in-phase branch of the compensation unit. However, since Glas teaches compensation factors affect the quadrature phase branch of the compensation unit but relates the invention is not limited in scope in that respect, figure 3, column 9, lines 10-14, it would have been obvious to one of ordinary skill in the art at the time of the

invention to alternatively arrange the amplification logic of Glas to affect the in-phase branch of the compensation unit which would also compensate for amplitude and phase imbalance.

Allowable Subject Matter

Claims 4-7, 9-12 and 20-22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

As to claims 4 and 9, the prior art made of record teach first and second amplification logic in the error compensating unit but do not teach the first and second amplification logic includes a plurality of selectable amplification modules.

As to claim 20, the prior art made of record teaches a method for determining an imbalance compensation amount but does not teach adjusting the amplification constant of a previous step by a second step size wherein the second step size is substantially greater than the first step size and repeating the adjustment steps M times wherein M is equal to a number of selectable amplification adjustments to one of the in-phase amplitude amplification constant or the phase amplification constant.

Conclusion

The prior art made of record and not relied upon but considered pertinent to applicant's disclosure includes Moon et al. (US 7,130,357), Webster et al. (US 6,931,343), Ding et al. (US 2005/0069050), Rahman et al. (US 2003/0174783), Ozluturk

et al. (US 6,377,620), Aleyunas et al. (US 5,705,949), Kirshenmann et al. (US 2004/0082305), Chiu (US 7,139,536), McVey (US 2002/0191713), Song et al. (US 2003/0112898) and Rahman (US 7,130,359).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Blane J. Jackson whose telephone number is (571) 272-7890. The examiner can normally be reached on Monday through Thursday, 7:30 AM-6:00 PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Urban can be reached on (571) 272-7899. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Blane J. Jackson